

Standardized Designs for Third Generation Ammonia-On-Demand™ Systems at AEP's Amos and Mountaineer Plants

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Summary

Due to increased governmental regulation of NO_x gases, many power plants have installed or plan to install Selective Catalytic Reduction (SCR) processes to reduce their NO_x emissions. The anhydrous ammonia often used for this process is dangerous, which has led to the development of Ammonia-On-Demand™ (AOD™), a system designed to convert granular urea to ammonia. This alternative offers increased safety and less environmental risk than anhydrous ammonia .

The first installation was in 2000 on an oil-fired 580 MW unit in Massachusetts, and was successful in demonstrating the AOD™ process. The following year, the AOD™ process was scaled up to 2,600 MW for the James M. Gavin plant of American Electric Power (AEP) in Cheshire, Ohio. The summer of 2002 marks the startup of the 3rd generation of AOD™ systems at AEP's Amos and Mountaineer plants and the development of the AOD™ system standard product line. The product line includes 5 reactor sizes, ranging in capacity from 250 to 4000 pounds of ammonia per hour. Each system consists of a feed preparation area, a reactor vessel, and ammonia injection spools.

New developments in the preparation and storage of urea solution include batch preparation of urea solution and isolation of the preparation step from the operation of the rest of the system. Optimization of the solution preparation step has resulted from operating results from the most recent installations, and includes new features for bulk urea handling and storage. Proprietary technology for urea solution preparation has resulted in minimal time for solution preparation, with lower operating cost and reduced requirements for solution storage.

The reactor vessel design has been optimized to improve system efficiency and operability. Operational data from the newest generation of systems proves the AOD™ system consumes less energy and is capable of tracking demand more precisely than in previous installations. This leads to tighter control of NO_x gas emissions with less energy input to the system. The increased tracking of ammonia demand is also beneficial in reducing ammonia slip through the SCR's. The improved operability, reduced operating costs and increased reliability of this latest generation of AOD™ systems provides the utility industry with a proven alternative to the more dangerous anhydrous or concentrated aqueous ammonia systems for application to SCR's.

The presentation will focus on recent design improvements and the impact of these improvements on the startup and initial operation of the first units in the third generation at AEP's Amos and Mountaineer generating plants. Early operating data and startup experience will be presented.